EXHIBIT A

(Modification Log)

```
2
       #* Filename: domino_manager
                                         Project: Cop
 3
 4
       #*
 5
       #* (C) Copyright Intel Corporation,
 6
       #* Licensed material -- Program property of Intel Corporation
 7
       #* All Rights Reserved
 8
       #*
 9
       #* This program is the property of Intel Corporation and is furnished
10
       #* pursuant to a written license agreement. It may not be used, reproduced,
11
       #* or disclosed to others except in accordance with the terms and conditions
12
       #* of that agreement.
13
14
15
16
       #* Original Author: Hans J. Greub Email:
17
18
      #* Functional description:
19
      #*
20
       #* This script extracts domino circuits and simulates the dominos and
21
      #* inverting gates igates in stages using dominosim for simulating the
22
       #* the dominos for chargesharing, residual (propagated noise from the
23
       #* input to the output), and the injected crosstalk voltage at the output,
24
      #* and using go_nm to characterize UGNMH vs Vout for custom or zgcells
25
      #* connected to dominos and and then propagates the worst case
26
      #* voltage drop on the domino output through the inverting gates to get
27
      #* the input residual for the next domino stage.
28
      #* All propagated residuals are captured in the file:
29
      #* xcap/domino/data/<fub>.residual
30
       #* A margin report for all domino outputs is written to the file:
31
      #* xcap/report/<fub>.domino_finalreport
32
      #*
33
      #**
34
       #*
35
36
37
38
39
      #
40
      # Data Structures
41
42
      # The Domino Output Noise Info is stored in the hash:
43
      # $DomOutput{$pathmill_node_name}=\@domino_output_record;
44
      # each entry contains pointer to a domino_output_record with the following format:
45
46
      @domino_output_record=($Reff,$Rline,$Ctot,$Cx,$Residual,$Peak,$Fub_Pin,$Supply_Noise,$ChargeSh
47
      aring,$Average_Attacker_Slope,$assumed_fixed_value);
48
      # The Domino Input Noise Info is stored in the hash:
49
      # $DomInput{$pathmill_node_name}=\@domino_input_record;
50
      # Each entry points to a record which contains:
51
      #
52
       @domino_input_record=($Reff,$Rline,$Ctot,$Cx,$Residual,$Source_of_Residual,$Peak,$Fub_Pin,$Suppl
53
      y_Noise,$Average_Attacker_Slope);
54
      # changed keys from ipath to pathmill notation
```

```
# - added the mapping hashes for simulation
 2
      # %map_out2igate{$node} = "igate${id}$fub"
 3
      # %map_out2domino{$node}="dom${id}$fub"
 4
      # these hashes map an output node to a domino or igate cell name
 5
      # added the following hashes
 6
      #
 7
      @receiver_record=($domino_driven_input_pin,$source_config,$invelm_output,$invelm_name,$invelm_ty
 8
 9
      # The hash %map_igate_out2igate_record maps igate outputs to igate records
10
      #@igate_record=($invelm_type,$source_config,\@domino_driven_input_list,
11
                 \@domino_driven_input_pin_list,$invelm_name);
12
13
      # obsolete $map_igate_receiver{$domino_driven_input}=\@receiver_records;
14
      # $map_igate_out2cell_type{$igate_output}=$cell_type;
15
      # The residual on igate outputs must be propagated thru
16
      # passgates. The hash %short_igate2dynin with key $igate_output_node
17
      # points to an array (list) of dynin nodes to which the residual
18
      # needs to be propagated.
19
      # $short_igate2dynin{$igate_node}=\@dynin_node_list;
20
      # push(@{$short_igate2dynin{$igate_node}},$dynin_node);
21
      #
22
      # Modification Log
23
               - added fub_boundary condition check for fub outputs
24
             - added fub_boundary statements for fub input
25
      #
             - changed no receivers found on domino outputs to
26
      #
              warning messages to handle nocons better
27
      #
                - moving databases instead of deleting them!
28
      #
               - fixed bug in domino_stageN.pN cell list generation
29
      #
               - changed noise propagation from DYNOUT based to igate cell
30
      #
              based to conform to order in sim_sequence
31
      #
               - added -use_previous_results feature
32
      #
               - added archiving and output of $fub.residuals
33
      #
                - added database migration for -start_fresh option
34
      #
               - added $ENV{CSEJOBNOMAIL}="TRUE";
35
               - removed path to /usr/home1/hgreub version of
36
      #
              igate_identify
37
      #
               - removed path checking for domino_extract because
38
      #
              it hangs in CTM
39
      #
             - changed tesh path since /bin/tesh does not work in
40
              CTM
41
                - fixed bug in migrate_dp which cause domino_manager
42
              to quit if -start_fresh option is used and no db
43
              datafiles exist
44
               - fixed 'nbq -Pcs' instead $command_prefix bug in
45
              domino simulate section
46
               - added -f flag to tesh to fix some problems with
47
              setup in CTM
48
      #
               - added support for custom cells that the user wants
49
      #
              to treat like standard cells
50
      #
              if a cell custom_cell that is listed in the inv_element_fub.dat
51
      #
              file and thus was declared to be treated like a standard cell
52
      #
              in the xcap/domino/igate_no_extract_fub.dat file, domino_manager
53
      #
              looks for a command file "custom_cell.cmd" and if it exists
54
              will simulate this cell once and read in the results
      #
```

```
- removed -x from tcsh -f -x
 2
      #
                - changed pathmill2plus to not add fubname prefix for fub pins
      #
                - changed read_transgate_domino_sim, looks like header in the
 4
5
      #
               file changed
               - fixed bug in UGNMH computation, lowest UGNMH instead of highest
 6
       #
               UGNMH with lowest NT was kept
 7
      #
               - fixed bug in residual propagation through passgates, the new
 8
               residual value was copied in without checking whether the existing
      #
 9
      #
               value is (worst case)
10
       #
             - fixed argument processing so that domino_manager -<anything> gives
11
               usage message
12
                - added handling of case if 2*($vout-2*$vout2) is zero
       #
13
              in compute_propagated_residual()
      #
14
      #
                - added check for TIM version 2.8.b1
15
       #
                - added message to re-run xcap_mutex and xcap_change_psn
16
       #
               - added handling of domino/igate not reported condition in
17
      #
               sim seq file
18
       #
                - fixed migrate_db() for igate
19
       #
                - fixed worst noise level reported in domino_finalreport
20
                - added an enhancement to deal with multiple tri-state drivers
21
      #
               connected to an igate output node (works for stdcells only)
22
       #
               - fixed domino residual propagation bug, fub.residuals was correct
23
      #
              but %DomInput data was still bad
24
                - increased min chunk from 12 to 24 because of netbatch overflow.
      #
25
       #
                - changed initial values in DomOutput to make sure dominos that
26
              have not been simulated will fail
      #
27
       #
                - added sanity checks to read_sim_seq files
28
       #
                - fixed residual propagation through passgates
29
                 - added archiving of siminofo file used for domino simulation
30
31
32
       $VERSION="2.0";
33
       $last_modified="
34
35
36
37
38
                         This gives a time date of the LAST modification of some other "underlying" scripts
39
                         that domino_manager calls to do needed functions.
40
41
       total 124
42
                                                            build_for_xcap
                                        2151
       -rwxr-xr-x
                              users
43
                                                           domino2ipath
                                        13009
       -rwxr-xr-x
                              users
44
                                                            domino_extract
                                        10042
       -rwxr-xr-x
                              users
                                                            ggate_extract
45
                                        7072
       -rwxr-xr-x
                              users
46
                                                           igate_extract
                                        7710
       -rwxr-xr-x
                              users
```

EXHIBIT B

(Parameter Extraction Code)

```
1
      From the code "domino_extract":
 2
3
      #!/bin/csh
 4
 5
      # Created
                     by Mark Nardin
 6
      # For use in extracting domino circuit netlists for simulation
 7
 8
      set DOM_EXTRACT_EXE = $0
9
10
      if ( (\$\#argv == 0) | (\$1 == "-help") ) then
11
       echo " "
12
       echo "This MUST be run from a setup window where plus can be run."
13
       echo " "
14
       echo " "
15
       awk '/^#BEGINhelp_message/ {\
16
        getline\
17
         while ($1 != "#ENDhelp_message") {\
18
         print\
19
         getline\
20
        } }' $DOM_EXTRACT_EXE
21
       exit 0
22
      endif
23
24
      setenv WARD $WORK_AREA_ROOT_DIR
25
      setenv FUB $1$2
26
      setenv fub $1
27
28
      if !(-e $WARD/plus/frz/xcap_$fub.frz) then
29
       echo " "
30
       echo " Can not find the required freeze file:"
31
       echo " "$WARD/plus/frz/xcap_$fub.frz
32
33
       echo " Run the script: build_for_xcap "
34
       echo " "
35
       exit 0
36
      endif
37
38
39
      # Record the current directory
40
      set CUR_DIR = 'pwd'
41
42
      # Make the master command file that needs to be executed in plus
43
44
      rm -f $WARD/plus/cmd/domcall_tmp_$FUB.cmd
45
46
      # Making the start-up sequence for PLUS to run
47
      echo "Running plus and restarting the freeze file from xcap_<fub>.frz"
48
49
      echo "restart xcap_$fub" > $WARD/plus/cmd/domcall_tmp_$FUB.cmd
50
51
      # Making the series of commands that need to be run for each of the
52
      # individual domino nodes
53
54
      awk ' /^/ { \
```

```
print "put n "$1" domoutput_erc := TRUE"; \
       print "@""$WARD"'/plus/cmd/domselect_plus_""$FUB"'.cmd"; \print "@""$WARD"'/plus/cmd/select_temp_""$FUB"'.cmd"; \
 2
3
4
5
       print "system date"; \
       print "simulate -nojob -ignore -selected -sdp dom"$2"ext""$fub""; \
 6
7
8
9
       print "system process_ext dom"$2"ext""$fub"".sdp -create_template"; \
       print "system source "\$WARD"'/plus/cmd/make_delete_file_"\$FUB"'.tmp"; \
       print "@""$WARD"'/plus/cmd/delete_sources_""$FUB"'.tmp" } '\
        $WARD/plus/erc/domout_nodes_$FUB.dat >> $WARD/plus/cmd/domcall_tmp_$FUB.cmd
10
11
       # Make the plus command file that actually extracts the iPath
12
       # command file statements
13
```

EXHIBIT C

(Output Log)

```
ptdl:
                n>ls -l
 2
3
      total 528
                                     1139
                                                             -10:38:37#.ptdis91.gz
      -rwxr-xr-x
                            cop
 4
                                      473
                                                              -12:48:42#.ptdis12.gz
                            cop
      -rwxr-xr-x
 5
                                    265
                                                    faaddc.domino_extract_audit.gz
                           cop
                                    5749
                                                     faaddc.domino finalreport.complete.gz
                           cop
 7
                                    5759
                                                     faaddc.domino_finalreport.gz
                           cop
 8
                                    5749
                                                     faaddc.domino finalreport.previous.gz
                           cop
                                    3415
                                                     faaddc.domino_simulate.audit.gz
                           cop
10
                                                      faaddc.xcap_finalreport.gz
                           cop
                                   495820
      -rw-r--r--
11
12
      ptdl:mnardin>gzless faaddc.domino_finalreport.gz
13
14
      * DOMINO FLOW XCAP REPORT *
15
       **********
16
17
      domino_manager version 2.0, last modified on
18
19
                       : domino_manager faaddc -simulate -parallel 8 -netbatch iss_short
      Command Line
20
      TimeStamp
21
22
      USER
23
      WORK_AREA_ROOT_DIR: /prj/cop/work_root/feu/
24
      Note: The worst domino input residual reported is the worst residual
25
      propagated to the inputs from a previous domino stage, the worst case
26
      domino input noise is the worst total noise (power_supply_noise+residual+xtalk)
27
      on any domino input (not necessarily the input that had the worst residual)
28
29
      Report for all DYNOUT Nodes sorted based on margin
30
31
       ?.???V DYNOUT faaddd/i34/pp[71]
                                            (dom194faaddc)
32
           -W- no receiver found, verify NOCON!
33
           Voltage Drop: 0.130V (ChgSh(0.010V)+Residual(0.040V)+XTalk(0.055V)+PSN(0.025V))
34
           worst domino input noise : 0.111V on node: faaddd/i34/i13/i1/pp2nn[3]
35
           worst domino input residual: 0.029V from dom245faaddc
36
37
       ?.???V DYNOUT faaddd/i34/gg[71]
                                            (dom144faaddc)
38
           -W- no receiver found, verify NOCON!
39
           Voltage Drop: 0.199V (ChgSh(0.001V)+Residual(0.032V)+XTalk(0.141V)+PSN(0.025V))
40
           worst domino input noise : 0.120V on node: faaddd/i34/i13/i1/gg2nn[1]
41
           worst domino input residual: 0.029V from dom245faaddc
42
43
      *** The Noise on the following Domino Output Nodes is below the Receiver UGNMH ***
44
45
      +0.032V DYNOUT faaddd/i34/i31/gout[5] (dom104faaddc)
46
           Voltage Drop: 0.186V (ChgSh(0.001V)+Residual(0.085V)+XTalk(0.075V)+PSN(0.025V))
47
                                    : 1.582V (NT:0.218V) from
           worst receiver UGNMH
48
      zgca2nox800040x4000040x1024040x4000040
49
           worst domino input noise : 0.197V on node: faaddd/i34/i31/gg2nn[1]
50
           worst domino input residual: 0.073V from dom55faaddc
51
52
      +0.037V DYNOUT faaddd/i34/gg[29]
                                             (dom82faaddc)
53
           Voltage Drop: 0.208V (ChgSh(0.000V)+Residual(0.031V)+XTalk(0.152V)+PSN(0.025V))
54
                                   : 1.555V (NT:0.245V) from
           worst receiver UGNMH
55
      zgca2nox1000040x4000040x1024040x4000040
56
           worst domino input noise : 0.120V on node: faaddd/i34/i6/i1/gg2nn[1]
```

1 worst domino input residual: 0.028V from dom137faaddc 23456789 (dom211faaddc) +0.048V DYNOUT faaddd/i34/gg[17] Voltage Drop: 0.197V (ChgSh(0.000V)+Residual(0.031V)+XTalk(0.141V)+PSN(0.025V)) worst receiver UGNMH : 1.555V (NT:0.245V) from zgca2nox1000040x4000040x1024040x4000040 worst domino input noise : 0.120V on node: faaddd/i34/i4/i1/gg2nn[1] worst domino input residual: 0.028V from dom72faaddc 10 +0.050V DYNOUT faaddd/i34/pp[11] (dom55faaddc) Voltage Drop: 0.261V (ChgSh(0.010V)+Residual(0.031V)+XTalk(0.195V)+PSN(0.025V)) 11 : 1.489V (NT:0.311V) from 12 worst receiver UGNMH 13 zgca2nox1400040x3600040x1024040x3600040 14 worst domino input noise : 0.111V on node: faaddd/i34/i3/i1/pp2nn[3] 15 worst domino input residual: 0.028V from dom168faaddc 16 17 +0.051V DYNOUT faaddd/i34/pp[23] (dom189faaddc) Voltage Drop: 0.194V (ChgSh(0.010V)+Residual(0.031V)+XTalk(0.128V)+PSN(0.025V)) 18 19 worst receiver UGNMH : 1.555V (NT:0.245V) from zgca2nox1000040x4000040x1024040x400004020 21 worst domino input noise : 0.111V on node: faaddd/i34/i5/i1/pp2nn[3] 22 worst domino input residual: 0.028V from dom233faaddc 23 24 +0.055V DYNOUT faaddd/i34/pp[53] (dom126faaddc) 25 Voltage Drop: 0.242V (ChgSh(0.010V)+Residual(0.033V)+XTalk(0.174V)+PSN(0.025V)) 26 worst receiver UGNMH : 1.503V (NT:0.297V) from zi0bna02he 27 worst domino input noise : 0.111V on node: faaddd/i34/i10/i1/pp2nn[3] 28 worst domino input residual: 0.029V from dom24faaddc 29 30 31 32 33 34 ******** 35 * SUMMARY of DOMINO REPORT * 36 ********* 37 38 249 dominos were found in FUB: faaddc 39 40 0 dominos were not mapped or extracted 41 2 dominos had no receivers (NOCONS?) 42 0 dominos were assumed to be fixed for noise propagation 43 0 domino circuits had negative noise margins

EXHIBIT D

(Simulation Sequence File)

```
1
      sim_seq_faaddc.dat:
 2
3
      #<node_type>
                         <node_name>
 4
 5
      #simulation_count
 6
      domino_node
                         faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}%g[0]
 7
      domino_node
                         faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}%p[0]
 8
                         faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}%g[1]
      domino_node
 9
      domino_node
                         faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}%p[1]
10
11
12
      domino_node
                         faaddd{p62faaddd}/i34{p62faadyn72add}/i9{p62faadnew2zi0madd_add6c}%p[5]
13
      #simulation_count
14
                       faaddd{p62faaddd}/i34{p62faadyn72add}%qnn[48]
      igate_node
15
                       faaddd{p62faaddd}/i34{p62faadyn72add}%qnn[49]
      igate_node
16
                       faaddd{p62faaddd}/i34{p62faadyn72add}%qnn[50]
      igate_node
17
      igate_node
                       faaddd{p62faaddd}/i34{p62faadyn72add}%qnn[51]
18
      igate_node
19
      faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}/i0[1]{p62faaddczi0madd_pg
20
      genc}%net100
21
      igate_node
22
      faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}/i0[2]{p62faaddczi0madd_pg
23
      genc}%net100
24
      igate_node
25
      faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}/i0[3]{p62faaddczi0madd_pg
26
      genc}%net100
27
      igate_node
28
      faaddd{p62faaddd}/i34{p62faadyn72add}/i10{p62faadnew2zi0madd_add6c}/i0[4]{p62faaddczi0madd_pg
29
      genc}%net100
30
      igate_node
31
      faaddd{p62faaddd}/i34{p62faadyn72add}/i9{p62faadnew2zi0madd_add6c}/i1{p62fazi0madd_cla6c}%pp
32
      2nn[1]
33
      #simulation count
34
                         faaddd{p62faaddd}/i34{p62faadyn72add}%gg[50]
      domino_node
35
                         faaddd{p62faaddd}/i34{p62faadyn72add}%gg[51]
      domino_node
36
      domino_node
                         faaddd{p62faaddd}/i34{p62faadyn72add}%gg[52]
37
      domino_node
                         faaddd{p62faaddd}/i34{p62faadyn72add}%gg[53]
38
39
40
      domino_node
                         faaddd{p62faaddd}/i34{p62faadyn72add}%pp[50]
41
                         faaddd{p62faaddd}/i34{p62faadyn72add}%gg[47]
      domino_node
42
                         faaddd{p62faaddd}/i34{p62faadyn72add}%pp[47]
      domino_node
43
      #simulation_count
                         4.000
44
                       faaddd{p62faaddd}/i34{p62faadyn72add}/i16[3]{zi0madd_sume}%n0
      igate_node
45
                       faaddd{p62faaddd}/i34{p62faadyn72add}/i16[3]{zi0madd_sume}%ggnn
      igate_node
46
                       faaddd\{p62faaddd\}/i34\{p62faadyn72add\}/i31\{p62faa2ndcla\}\%pp2nn[10]
      igate_node
47
48
49
                       faaddd{p62faaddd}/i34{p62faadyn72add}/i31{p62faa2ndcla}%pp2nn[7]
      igate_node
50
      #simulation_count
                         5.000
51
      domino node
                         faaddd{p62faaddd}/i34{p62faadyn72add}/i31{p62faa2ndcla}%pp[10]
                         faaddd\{p62faaddd\}/i34\{p62faadyn72add\}/i31\{p62faa2ndcla\}\%gout[5]
52
      domino_node
53
                         faaddd{p62faaddd}/i34{p62faadyn72add}/i31{p62faa2ndcla}%gp[10]
      domino_node
54
```

1	••	
2	domino_node	faaddd{p62faaddd}/i34{p62faadyn72add}/i31{p62faa2ndcla}%pp[7]
3	domino_node	faaddd{p62faaddd}/i34{p62faadyn72add}/i31{p62faa2ndcla}%gp[3]
4	#simulation_coun	6.000
5	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[23]
6	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[29]
7	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[35]
8	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[41]
9	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[47]
10	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[53]
11	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[59]
12	igate_node	faaddd{p62faaddd}/i34{p62faadyn72add}%coutnn[65]

EXHIBIT E

(Simulation Time Stamp Log)

```
1
          -14:10:39#.ptdis86:
 2
       | Starting time: Fri
                            14:10:39
 3
       Command
                    : xcap/domino/data/nbq_domino_stage1.p1
       | Finishing time : Fri
                             14:41:59
 5
      ##
            14:10:40#.ptdis77:
 6
                            14:10:40
      | Starting time : Fri
 7
                    : xcap/domino/data/nbq_domino_stage1.p2
       Command
                            14:43:12
 8
      Finishing time: Fri
 9
           -14:10:41#.ptdis97:
10
      Starting time: Fri 14:10:41
       Command
11
                    : xcap/domino/data/nbq_domino_stage1.p3
12
                             14:42:03
       Finishing time: Fri
13
            -14:10:41#.ptdis75:
                            14:10:41
14
       Starting time: Fri
15
       Command
                    : xcap/domino/data/nbq_domino_stage1.p4
16
       | Finishing time : Fri
                             14:59:50
17
      -14:10:42#.ptdis116:
18
      Starting time: Fri
                            14:10:42
19
                    : xcap/domino/data/nbq_domino_stage1.p5
       Command
20
      | Finishing time : Fri
                             14:58:43
21
           -14:10:42#.ptdis108:
22
      Starting time: Fri 14:10:42
23
       Command
                    : xcap/domino/data/nbq_domino_stage1.p6
24
      | Finishing time : Fri | 15:00:26
25
      ## -14:10:43#.ptdis14:
                           14:10:43
26
      Starting time: Fri
27
                    : xcap/domino/data/nbq\_domino\_stage1.p7
       Command
28
       Finishing time: Fri
                             14:52:31
29
           -15:00:56#.ptdis78:
30
      Starting time: Fri 15:00:56
31
                    : xcap/domino/data/nbq_domino_stage3.p1
       Command
32
      Finishing time: Fri
                             15:48:19
33
             -15:00:57#.ptdis99:
34
                            15:00:57
      Starting time: Fri
35
                    : xcap/domino/data/nbq_domino_stage3.p2
       Command
36
       Finishing time: Fri 15:47:51
37
            -15:00:57#.ptdis109:
38
      Starting time: Fri 15:00:57
39
                    : xcap/domino/data/nbq_domino_stage3.p3
       Command
                             15:47:53
40
      | Finishing time : Fri
41
             -15:00:58#.ptdis89:
42
      Starting time: Fri
                           15:00:58
43
       Command
                    : xcap/domino/data/nbq_domino_stage3.p4
44
      | Finishing time : Fri
                             15:47:51
45
      ## -15:00:58#.ptdis87:
46
      Starting time: Fri 15:00:58
47
                    : xcap/domino/data/nbq_domino_stage3.p5
       Command
48
      Finishing time: Fri
                              15:39:01
49
            -15:49:02#.ptdis97:
50
      Starting time: Fri 15:49:02
51
       Command
                    : xcap/domino/data/nbq_igate_stage4.pl
52
      | Finishing time : Fri
                             16:00:56
53
      ## -16:01:05#.ptdis86:
54
      Starting time: Fri 16:01:05
```

2 3 4 5 6